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FOREST INSECT SURVEY

BLACK'S MOUNTAIN EXPERIMENTAL FOREST

SEASON OF 1940

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FOREST INSECT LABORATORY
BERKELEY, CALIFORNIA
MARCH 11, 1941

FOREST INSECT SURVEY

BLACK'S MOUNTAIN EXPERIMENTAL FOREST

SEASON OF 1940

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FOREST INSECT SURVEY
BLACK'S MOUNTAIN EXPERIMENTAL FOREST

SEASON 1940

INTRODUCTION

THE COMPLETE 1939 INSECT LOSS WAS RECORDED ON THE BLACK'S MOUNTAIN EXPERIMENTAL FOREST DURING THE SURVEY OF THE AREA IN 1940. THIS REPORT IS PREPARED TO FURNISH INFORMATION CONCERNING (1) THE TOTAL LOSS THAT OCCURRED ON 7,726 ACRES IN UNCUT COMPARTMENTS DURING 1939, (2) AN ESTIMATE OF THE 1940 LOSS AND, (3) THE OUTLOOK OF CONDITIONS TO BE EXPECTED ON THE VIRGIN AREAS DURING 1941. OTHER PHASES OF THE WORK AT BLACK'S MOUNTAIN WILL BE COVERED IN SEPARATE REPORTS.

AT THE START OF COOPERATIVE WORK BETWEEN THE CALIFORNIA FOREST AND RANGE EXPERIMENT STATION AND THE BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE ON THE EXPERIMENTAL PROGRAM IN 1937 THERE WAS AN AGREEMENT BETWEEN THE TWO AGENCIES THAT A SEASONAL CRUISE OF THE AREA TO RECORD INSECT CAUSED LOSS WOULD BE MADE BY THE BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE PERSONNEL. EACH SEASONAL CRUISE ON THE AREA WAS TO INCLUDE THE ENTIRE 10,000 ACRES COMPRISING THE EXPERIMENTAL AREA. THIS COMPLETE COVERAGE WAS DESIRED TO (1) INSURE AN ACCURATE ACCOUNTING OF INSECT CONDITIONS, COMPARTMENT BY COMPARTMENT, (2) TO DETECT POSSIBLE OUTBREAKS OF "HOT SPOT" INFESTATION CENTERS, (3) TO SERVE AS A BASIS FOR RECOMMENDATIONS AS REGARDS TO CUTTING OPERATIONS AND (4) TO FURNISH RECORDS TO THE EXPERIMENT STATION FOR THE MAINTAINANCE OF THEIR STAND INVENTORY.

A RECORDING OF THE 1939 INSECT LOSS WAS COMPLETED DURING JULY

AND AUGUST, 1940 BY A THREE MAN CREW COMPOSED OF C. B. EATON, J. W. JOHNSON, AND THE WRITER. THIS CRUISE OF THE AREA WAS THE THIRD IN THE SERIES OF SURVEYS SINCE 1937. LOSS CONDITIONS DURING PRECEDING YEARS HAVE BEEN REPORTED UPON AT THE COMPLETION OF EACH FIELD SEASON, (1 AND 2).

CHARACTERISTICS OF THE 1939 LOSS

THE 1940 CRUISE FINISHED THE RECORDING OF ALL OF THE TREES KILLED IN 1939 AND COMPLETED THE LOSS RECORD FOR THAT YEAR, (TABLE 1). FOR THE AREA AS A WHOLE, THE 1939 LOSS IN PINE AVERAGED 102 BOARD FEET PER ACRE. THIS REPRESENTS AN INCREASE OF 54.5 PERCENT OVER 1938.

A SHORT DISCUSSION OF THE SALIENT FEATURES OF THE 1939 LOSS ON UNCUT AREAS ON THE EXPERIMENTAL FOREST HAS BEEN SEGREGATED BY BLOCKS REPRESENTING UNIFORM AREAS, FOR IT IS DIFFICULT TO PRESENT AN ACCURATE ACCOUNTING OF CONDITIONS OVER A LARGE AREA THAT HAS HETEROGENEOUS SITE AND STAND CONDITIONS WHICH INFLUENCE INFESTATION TRENDS.

BLOCK A (ASPEN FLAT. GENTLE SOUTHERLY EXPOSURE. PP-JP-SAGE TYPE)

LOSSES IN PONDEROSA AND JEFFREY PINE DURING 1939 SHOW AN INCREASE OF 85.7 PERCENT OVER 1938, AVERAGING 65 BOARD FEET PER ACRE. LOSSES IN BOTH PINE SPECIES WERE MOST FREQUENT IN THE DECADENT TREE TYPES, OCCURRING PRIMARILY AS SINGLY INFESTED INDIVIDUALS. THE JEFFREY PINE BEETLE WAS NOTICED AS BEING PARTICULARLY AGGRESSIVE IN THE RELATIVELY PURE JEFFREY PINE AREAS IN SECTION 12.

BLOCK B (BLACK'S MOUNTAIN. SOUTH EXPOSURE. PP-JP-WF TYPE)

PINE LOSSES AVERAGED 136 BOARD FEET PER ACRE DURING 1939, AN INCREASE OF 46.3 PERCENT OVER 1938. LOSSES IN PONDEROSA PINE ACCOUNTED FOR 90 PERCENT OF THE INCREASE. GROUP KILLS IN BOTH TREE SPECIES WERE FREQUENT, JEFFREY PINE LOSS OCCURRING MOST OFTEN IN PAIRS AND PONDEROSA PINE IN GROUPS OF TWO, THREE, FOUR, OR AS MANY AS SEVEN TREES.

BLOCK C (CONE MOUNTAIN. NORTH AND WEST EXPOSURE. PP-WF TYPE)

THE AVERAGE PINE LOSS DURING 1939 WAS 110 BOARD FEET PER ACRE, AN INCREASE OF APPROXIMATELY 83 PERCENT OVER 1938. MORE THAN 50 PERCENT OF THE TREES KILLED WERE IN DIAMETERS ABOVE 32", BREAST HIGH, REPRESENTING TREES OF COMPARATIVELY HIGH VALUES. SINGLY KILLED INDIVIDUALS AND SMALL GROUP KILLS OF TWO, THREE AND FOUR TREES WERE MOST OFTEN ENCOUNTERED IN THE LOSS RECORD.

BLOCK G (GRASS VALLEY. SOUTHWEST EXPOSURE. PP-JP TYPE)

THE 1939 AVERAGE LOSS OF 72 BOARD FEET PER ACRE REPRESENTS ONLY A 7.4 PERCENT INCREASE OVER 1938. THIS LOWER AVERAGE OF CURRENT LOSS ON THE REMAINING VIRGIN AREAS IN BLOCK G IS ATTRIBUTED TO THE SANITATION-SALVAGE CUTTING WHICH HAS REMOVED THE HIGH RISK MATERIAL FROM MOST OF THE COMPARTMENTS SHOWING A HIGH YEARLY LOSS RECORD. NO AREAS WERE NOTED IN WHICH CONCENTRATED LOSSES WERE OCCURRING EXCEPT IN COMPARTMENT G2-12, A "NATURAL AREA" WHICH WILL REMAIN UNDISTURBED BY LOGGING METHODS OR CONTROL MEASURES.

BLOCK P (PATTERSON MOUNTAIN. SOUTHWEST EXPOSURE. PP-JP-WF TYPE)

THE 1939 LOSS IN PONDEROSA AND JEFFREY PINE AVERAGED 115 BOARD FEET PER ACRE, A 64.7 PERCENT INCREASE OVER 1938. ON INDIVIDUAL COMPARTMENTS THE SEASON'S KILL RANGED FROM 40-298 BOARD FEET PER ACRE. PONDEROSA PINE PREDOMINATED IN THE LOSS RECORD. LOWER THAN AVERAGE INFESTATIONS WERE NOTED IN THE NORTH HALF OF SECTION 6 AND IN THE TOP TIER OF COMPARTMENTS IN SECTION 1.

COMPARISON OF THE 1939 AND 1940 LOSS ON UNTREATED COMPARTMENTS

A CRUISE OF 1,375 ACRES IN UNCUT COMPARTMENTS WAS MADE DURING LATE OCTOBER AS A SAMPLE OF THE 1940 INFESTATION TREND IN VIRGIN AREAS. A COMPARISON OF THE 1939 AND 1940 LOSSES WILL BE CONFINED TO THE COMPARTMENTS SAMPLED IN 1940 BECAUSE OF ERRORS WHICH MAY BE INVOLVED IN EXPANDING A SAMPLE CRUISE TO REPRESENT CONDITIONS OVER THE AREA AS A WHOLE. IN THE COMPARISON GIVEN IN TABLE 2, THE 1940 LOSSES HAVE BEEN INCREASED BY 20 PERCENT TO ADJUST FOR INFESTED TREES WHICH COULD NOT BE EXPECTED TO BE SPOTTED AT THE TIME THE FALL CRUISE WAS MADE.

TABLE 2 SHOWS THAT THE 1940 SEASONAL LOSS ON THE AREA SAMPLED HAS INCREASED 73 PERCENT OVER 1939. HOWEVER, THE 1939 LOSS ON THE COMPART-

MENTS CRUISED FOR THE SAMPLE OF 1940 LOSS TRENDS WAS APPROXIMATELY 13 PERCENT ABOVE THE 1939 AVERAGE FOR THE AREA AS A WHOLE. ON THAT BASIS THEN, WE MIGHT EXPECT THE SAMPLED LOSS IN 1940 WOULD SHOW A SIMILAR DEVIATION FROM THE AVERAGE LOSS TO BE EXPECTED ON THE ENTIRE AREA. THUS A 13 PERCENT CORRECTION HAS BEEN INCLUDED IN ESTIMATING THAT THE 1940 PINE LOSS ON UNCUT COMPARTMENTS WILL AVERAGE 173 BOARD FEET PER ACRE.

IN GENERAL, WITH THE EXCEPTION OF THE MORE FREQUENT OCCURRENCE OF INFESTED TREES IN THE CURRENT LOSS RECORD, THE CHARACTERISTICS OF THE 1939 AND 1940 LOSS WERE QUITE SIMILAR. IT WAS OBSERVED THAT MANY OF THE TREES KILLED DURING 1940 OCCURRED IN THE SAME GROUP OR WITHIN A SHORT DISTANCE OF TREES KILLED IN 1939, A HABIT NOT GENERALLY CONSIDERED AS COMMON IN WESTERN PINE BEETLE INFESTATIONS. NO PARTICULAR EXPLANATION OF THIS APPARENT ASSOCIATION OF CURRENT AND PAST LOSS CAN BE FOUND UNLESS IT COULD BE THAT A PARTIAL ATTACK OCCURRED ON SOME OF THE TREES IN 1939 WHICH WERE LATER COMPLETELY INFESTED AND KILLED DURING 1940.

TABLE 2

COMPARISON OF 1939 AND 1940 LOSSES ON 15 COMPARTMENT AREAS.

COMP'T NUMBER	TIMB'D. AREA	1939 LOSS TREES	1939 LOSS VOLUME	1939 LOSS VOL/ACRE	1940 LOSS (ESTIMATED) TREES	1940 LOSS (ESTIMATED) VOLUME	1940 LOSS (ESTIMATED) VOL/ACRE
A21-10	64.7	3	2,972	46	1	514	8
B22-4	85.1	1	118	1	12	11,051	130
B24-4	91.2	18	14,959	164	17	11,462	126
B24-7	101.3	8	9,818	97	13	16,962	167
B29-10	96.3	8	11,423	119	13	18,086	188
B30-1	85.1	1	1,269	21	11	21,552	253
B30-3	83.0	8	14,023	169	8	14,491	175
B30-6	131.4	19	26,776	204	20	30,444	232
C4121	72.0	8	10,790	150	7	6,985	97
G2-12	143.1	12	10,589	74	34	44,863	314
G6-15	58.9	8	7,274	123	16	11,511	195
G9-15	86.0	2	1,868	22	13	18,234	212
P18-27	84.3	11	12,611	150	14	23,022	273
P19-25	92.3	12	11,784	128	17	19,584	212
P21-28	99.9	21	21,741	218	26	24,324	243
TOTAL	1,374.6	140	158,515		222	273,085	
AVERAGE				115			199

OUTLOOK FOR 1941

A CONTINUED INCREASE IN LOSS ON VIRGIN AREAS IS EXPECTED DURING 1941. THIS FORECAST IS BASED ON THE EVIDENCE SHOWN BY THE SUCCESS OF ATTACKING ADULTS IN MANY OF THE OVERWINTERING TREES. ALSO, OVERWINTERING ADVANCED BROODS WERE OBSERVED AS BEING PARTICULARLY HEAVY AND SUCCESSFUL. PROVIDING ADVERSE FACTORS DO NOT MATERIALLY REDUCE BARK BEETLE BROODS, THE PREVALENCE OF AN ABUNDANCE OF SUITABLE HOST MATERIAL ON THE VIRGIN AREAS TOGETHER WITH THE EXPECTED HEAVY EMERGENCE OF POPULATIONS FROM WINTER TREES FORM THE PRIMARY BASIS IN PREDICTING THE INCREASE OF 1941 LOSS.

COMPARISON OF UTILIZATION THROUGH SANITATION-SALVAGE LOGGING AND TOTAL INSECT LOSS ON UNCUT AREAS. B. M. E. F. 1937-1940 INCLUSIVE.

THE UTILIZATION OF VALUES IN TREES WHICH ARE EXPECTED TO DIE AND THE PROTECTION OF THE RESERVE STAND FROM INSECT ATTACK UNTIL LATER SILVICULTURAL CUTS CAN BE MADE ARE THE TWO MAIN FEATURES OF THE SANITATION-SALVAGE TREATMENT. IT HAS BEEN SHOWN (2) THAT A SUBSTANTIAL REDUCTION IN INSECT CAUSED LOSS RESULTS WHEN AREAS ARE TREATED BY THIS LIGHT CUTTING OPERATION. HOWEVER, IN A COMPARISON OF VOLUME OF LOSS ON UNCUT AREAS WITH THE VOLUME OF HIGH RISK MATERIAL UTILIZED THROUGH SANITATION-SALVAGE TREATMENT, TABLE 3, IT IS SHOWN THAT THE VOLUME UTILIZED IN HIGH RISK TREES HAS BEEN BUT 16 PERCENT MORE THAN THE TOTAL LOSS RESULTING FROM INSECT ATTACKS, SINCE OPERATIONS WERE STARTED ON THE EXPERIMENTAL AREA IN 1937.

WITH THE EXPECTED INCREASE IN LOSS DURING 1941 AND THE POSSIBILITY OF ADDITIONAL INCREASES DURING THE NEXT FEW SEASONS, THE SPREAD BETWEEN TOTAL VOLUME UTILIZATION THROUGH SANITATION-SALVAGE TREATMENT AND TOTAL VOLUME OF LOSS ON THE REMAINING UNCUT AREAS MAY BE EVEN LESS. THE FACT THAT ONLY 16 PERCENT MORE VOLUME HAS BEEN SALVAGED THAN HAS BEEN DESTROYED BY

INSECTS POINTS STRONGLY TO THE NECESSITY FOR A SPEED UP IN COVERAGE OF THE ENTIRE AREA BY THE SANITATION-SALVAGE OPERATION.

TABLE 3

COMPARISON OF UTILIZATION THROUGH SANITATION-SALVAGE LOGGING AND TOTAL INSECT LOSSES. B. M. E. F. 1937-1940 INCLUSIVE.

		INSECT LOSS	UTILIZATION THRU S.S. TREATMENT	
	VIRGEN	TOTAL B. M.	(METHOD OF CUTTING PLOTS EXCLUDED)	
YEAR	ACREAGE	VOLUME	AREA TREATED	B.M. VOLUME REMOVED.
1937	8891.7	609,000	243.0	668,600
1938	8479.0	556,300	288.4	875,900
1939	7726.3	785,400	577.0	1,668,700
1940	7028.7	1,229,600*	621.6	1,649,200
TOTAL		3,080,300		4,862,400

* (ESTIMATED 1940 LOSS)

RECOMMENDATIONS

THE REMOVAL OF HIGH RISK TREES THROUGH SANITATION-SALVAGE LOGGING HAS BEEN ACCEPTED AS THE MOST SATISFACTORY MEANS AVAILABLE OF CONTROLLING FOREST INSECT INFESTATIONS ON THIS EXPERIMENTAL AREA. DIRECT CONTROL MEASURES INVOLVING PEELING AND BURNING OF INFESTED MATERIAL WERE CONSIDERED IN 1939 FOR REDUCING AND PREVENTING THE INCREASE IN LOSS. HOWEVER, THAT CONSIDERATION WAS ABANDONED AFTER IT WAS DECIDED TO ATTEMPT A MORE RAPID COVERAGE OF THE ENTIRE EXPERIMENTAL FOREST AREA BY THE SANITATION-SALVAGE TREATMENT. THE TREATMENT HAS BEEN SPEEDED UP TO SOME EXTENT SINCE 1939. NEVERTHELESS, IT AGAIN MUST BE STRESSED THAT IF THE AIM IN THE SANITATION-SALVAGE TREATMENT IS TO HARVEST THE HIGH RISK TREES OVER AS MUCH OF THE AREA AS POSSIBLE BEFORE THEY DIE OR DETERIORATE, A STILL MORE RAPID COVERAGE OF THE REMAINING UNCUT AREA WILL BE NECESSARY.

SUMMARY

THE COMPLETE 1939 INSECT LOSS RECORD ON THE BLACK'S MOUNTAIN EXPERIMENTAL FOREST WAS RECORDED DURING THE SEASONAL CRUISE OF THE AREA WHICH WAS MADE DURING JULY AND AUGUST, 1940. THE TOTAL 1939 PINE LOSS ON THE AREA AVERAGED 102 BOARD FEET PER ACRE, AN INCREASE OF 54.5 PERCENT OVER 1938. BOTH PONDEROSA AND JEFFREY PINE SHOWED AN INCREASE IN LOSS. A MAJORITY OF ALL INFESTED TREES OCCURRED EITHER SINGLY OR IN SMALL GROUPS WHICH WERE QUITE EVENLY DISTRIBUTED OVER THE UNCUT AREA.

THE 1940 LOSS TREND ON THE UNCUT AREAS WAS SAMPLED DURING OCTOBER BY A CRUISE OF 1,375 ACRES. FROM THIS SAMPLE CRUISE IT HAS BEEN ESTIMATED THAT THE 1940 LOSS WILL SHOW AN INCREASE OF 70 PERCENT OVER 1939, AVERAGING 173 BOARD FEET PER ACRE.

DURING 1941 THE OUTLOOK IS FOR STILL HEAVIER LOSSES.

A COMPARISON OF UTILIZATION THROUGH SANITATION-SALVAGE LOGGING AND TOTAL INSECT LOSS IN THE SURROUNDING UNCUT AREAS DURING THE FOUR YEAR PERIOD FROM 1937-1940 INCLUSIVE SHOWED THAT 84 PERCENT AS MUCH VOLUME HAS BEEN KILLED BY INSECTS IN THE UNCUT AREA AS WAS UTILIZED THROUGH SANITATION-SALVAGE CUTTING ON THE TREATED AREA.

IT HAS BEEN RECOMMENDED THAT A RAPID COVERAGE BE ATTEMPTED BY A SANITATION-SALVAGE TREATMENT ON THE REMAINING UNCUT AREA IN ORDER TO UTILIZE MORE OF THE MATERIAL THAT NOW IS BEING KILLED BY INSECTS.

REFERENCES

1. BONGBERG, J. W. "INSECT LOSS SURVEY. BLACK'S MOUNTAIN EXPERIMENTAL FOREST". SEASON 1938. STATION REPORT, BERKELEY, CALIFORNIA. MARCH 13, 1939.

2. _____ "INSECT LOSS SURVEY, BLACK'S MOUNTAIN EXPERIMENTAL FOREST. SEASON 1939. STATION REPORT, BERKELEY, CALIFORNIA. JANUARY 12, 1940.

TABLE 1

INSECT LOSS - BLACK'S MOUNTAIN EXPERIMENTAL FOREST

		1938 LOSS				1939 LOSS				1940 (ESTIMATED) LOSS*			
BLOCK	TREE SPECIES	TIMB. AREA (UNCUT)	NO. OF TREES	TOTAL VOLUME	VOL. /AC.	TIMB. AREA (UNCUT)	NO OF TREES	TOTAL VOLUME	VOL. /AC.	TIMB. AREA SAMPLED	NO OF TREES	TOTAL VOLUME	VOL. /AC.
A	P. PINE	800.6	8	10,738	13	800.6	16	24,461	31	64.7	-	-	-
	J. PINE		8	17,398	22		13	27,480	34		1	514	8
	W. FIR		-	-	--		-	-	-		-	-	-
	I. CEDAR		-	-	--		-	-	-		-	-	-
B	P. PINE	941.5	55	81,988	87	941.5		115,150	122	673.4	80	102,744	153
	J. PINE		4	5,312	6		90	13,373	14		14	22,565	34
	W. FIR		8	6,042	6		9	9,003	10		10	10,651	16
	I. CEDAR		1	464	-		7	-	-		-	-	-
							-						
C	P. PINE	2,351.0	102	138,714	59	2,351.0	169	259,764	110	72.0	7	6,985	97
	J. PINE		2	1,365	1		1	186	-		-	-	-
	W. FIR		35	34,395	15		58	55,966	24		1	2,158	30
	I. CEDAR		2	126	-		1	820	-		-	-	-
G	P. PINE	2,382.5	72	114,658	49	1,629.8	62	81,209	53	288.0	58	69,216	240
	J. PINE		20	42,291	18		17	28,639	19		5	6,571	23
	W. FIR		6	9,713	4		2	4,010	3		3	6,000	21
	I. CEDAR		-	-	-		-	-	-		-	-	-
P	P. PINE	2,003.4	91	107,112	53	2,003.4	136	174,483	87	276.5	48	55,183	200
	J. PINE		26	36,718	18		41	60,636	30		10	11,747	42
	W. FIR		12	9,557	5		32	20,553	10		-	-	-
	I. CEDAR		3	2,565	1		3	3,722	1		1	233	-
TOTAL	P. PINE	8,479.0	331	453,210	54	7,726.3	473	655,067	86	1,374.6	193	234,128	170
	J. PINE		60	103,084	12		81	130,314	17		30	41,397	30
	W. FIR		62	59,961	7		99	89,532	12		14	18,809	14
	I. CEDAR		6	3,155	-		4	4,542	-		1	233	-

* TOTAL 1940 PINE LOSS ESTIMATED TO BE 173 B.M. PER ACRE, 13% ADJUSTMENT MADE FOR AREA SAMPLED.